



STOW DMT Experiment



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Overview

- **Synthetic Theater of War (STOW)**

Capabilities

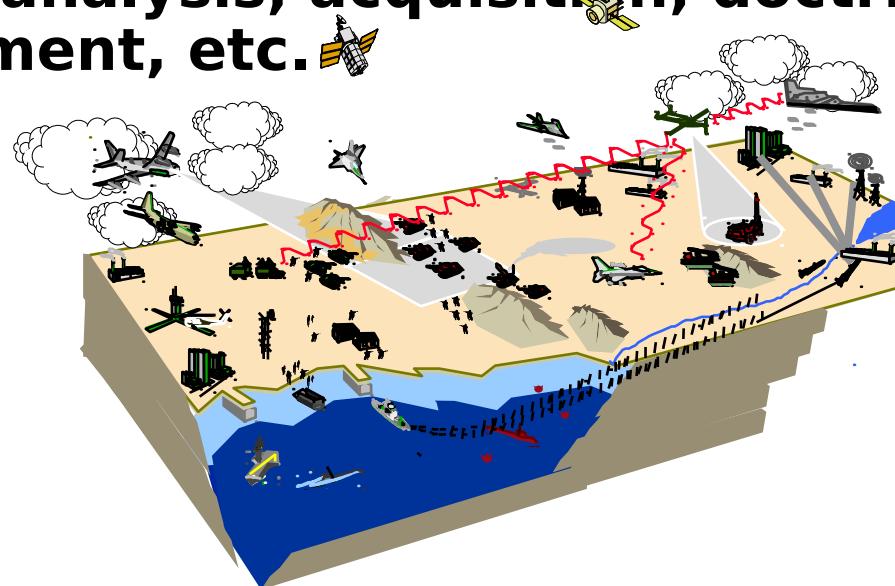
- **DMT Experiment with AFRL and ASC/YW**



Synthetic Theater of War



- Develop technologies to:
 - Create a high fidelity seamless synthetic battlespace
 - Support training and mission rehearsal
 - Support analysis, acquisition, doctrine development, etc. 



Leap Ahead in Simulation
Technology



What is STOW?



- **Technologies integrated to create a JOINT SYNTHETIC BATTLESPACE**
 - **Discrete, Authoritative Models of Forces and Sensors**
 - **Realistic, Tactically Significant Environments**
 - **Composable, Open System Architecture**
 - **3-D Visualization**
 - **High Speed Data Networks**
 - **C4I Interfaces**



Synthetic Forces

Behaviorally accurate, intelligent, autonomous Forces and Sensors fully integrated into the Joint Synthetic Battlespace

- **Behaviorally Realistic Platforms (Tanks, Ships, Planes)**

- *Army Heavy Bde*
- *Navy CVBG / ARG*
- *Marine Expeditionary Force*
- *Air Force Composite Wing*
- *Opposing Forces*
- *UK Rapid Deployment Force*

- **Integrated Environmental Effects**

- **Realistic Sensor Performance**

- **Command Entities in Software**

- *Platoon, Company, Battalion Commander*
- *Command & Control Simulation Interface Language (CCSIL)*



- **Object Based Architecture/Modular Design**



Synthetic Environments



Integrated environmental models and databases to form a **Realistic, Tactically Significant Dynamic Battlespace.**

- Multiple resolution terrain and bathymetric databases
- Tactically significant environmental effects
- Multi-state Objects (targets)
- Real-Time Weather



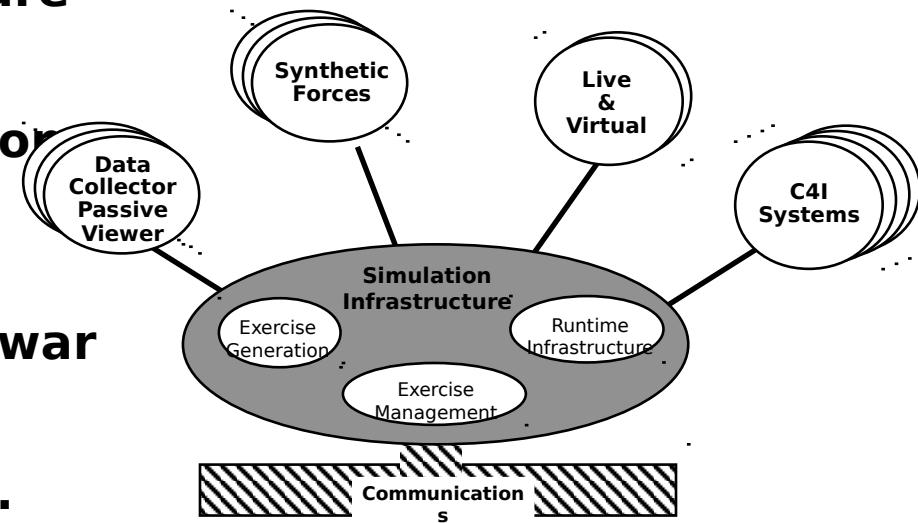


Simulation Infrastructure



Simulation management infrastructure that allows **multiple, geographically dispersed Live-Virtual-Constructive activities** to interact in a **Common Synthetic Battlespace**

- Large scale High Level Architecture-compliant simulation framework.
- Capability for Seamless integration of:
Live-Virtual-Constructive
- Warfighters interface thru go-to-war systems.
- Access from warfighters location.
- Support for exercise planning and generation, simulation runtime, data collection and After Action Review





STOW Summary



- **Fully interoperable entity level combat vehicle representations**
- **Increased validity of combat interactions**
 - *Capability to audit individual munitions from planning through employment*
- **Scalable for individual, unit, component, and JTF level training**
- **Includes tactical level digital and voice C2**
- **Decreased resources (time, personnel, equipment)**



FY98 DMT Experiment

Objectives

- **Integrate virtual simulators with the HLA compliant STOW synthetic battlespace**
 - *Distributed Data Management (DDM)*
 - *STOW Synthetic Environment for F-16 out-the-window imagery*
- **Demonstrate STOW Air Synthetic Force capability to support DMT-like training**
 - *Including human to synthetic communications*
- **Identify enhancements to virtual simulators and to STOW technologies for DMT development**
 - *To be done...*



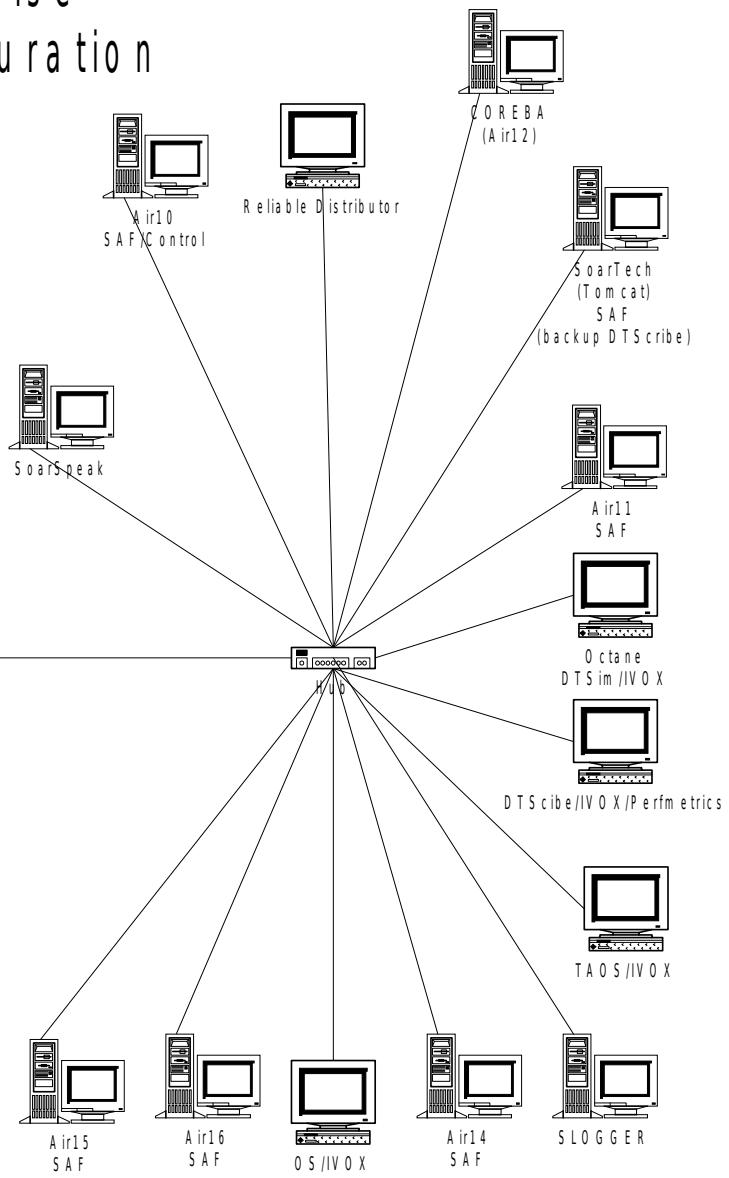
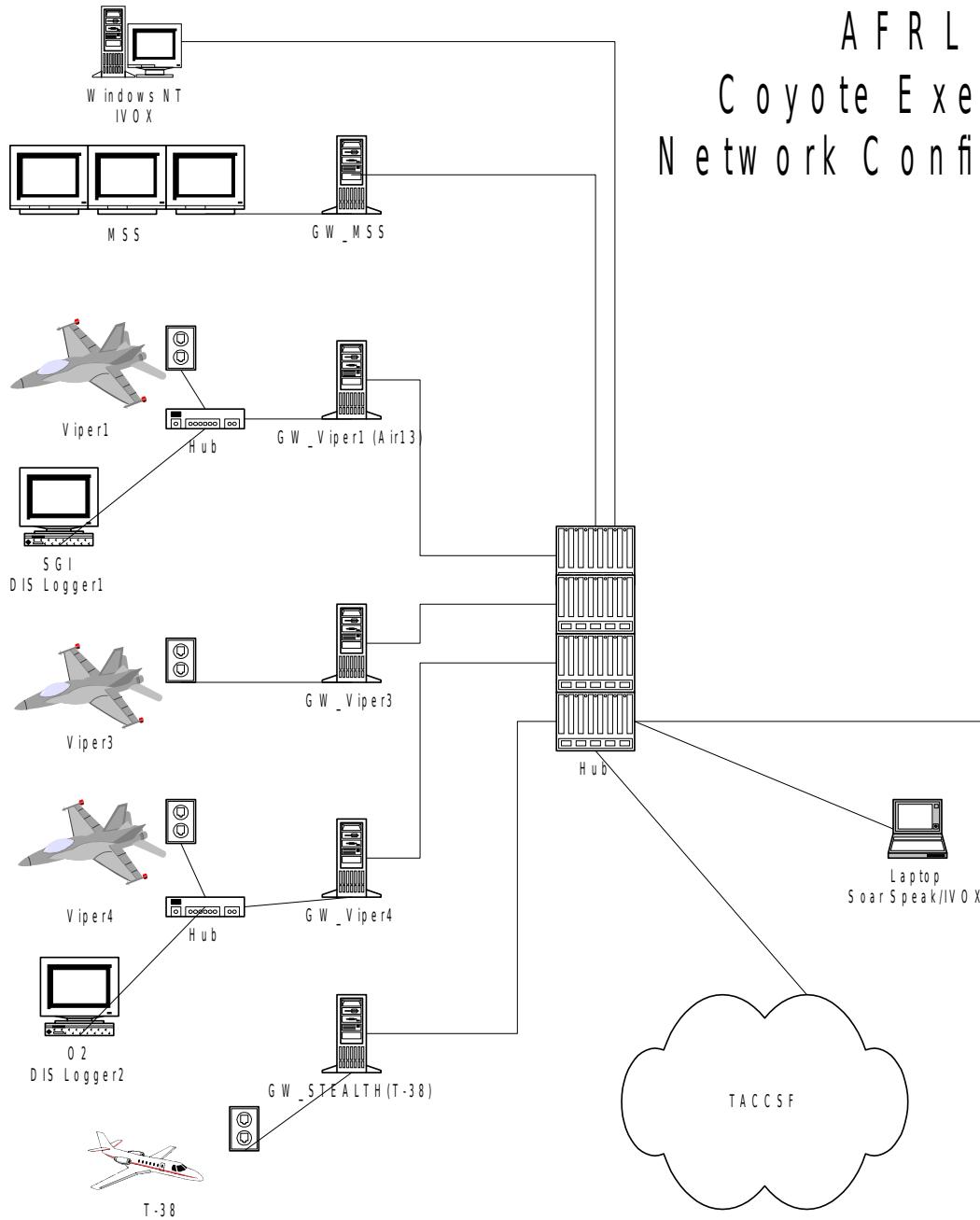
DMT Experiment Approach

- **Integrate AFRL and TACCSF virtual simulators using HLA interfaces w/DDM**
 - *AFRL provides F-16 and A-10 simulators*
 - *TACCSF provides AWACS virtual simulator over existing T-1 WAN*
- **Instrument each network “layer” to determine actual cost in terms of latency compared to DIS**
- **Integrate STOW 3-D and SE applications with AFRL virtual simulators**

A F R L

Coyote Exercise

Network Configuration





DMT Experiment Products



- **HLA Interface**
 - *Links DIS compliant virtual simulators in STOW*
 - *Links virtual simulators in STOW including synthetic environments*
 - *Mailed one to Kelly AFB and they were part of Coyote testing*
- **Enhanced AirSF/Soar (JointSF)**
 - *Intelligent adversary and supporting forces*
- **SoarSpeak**
 - *Direct human to synthetic voice C2 (AWACS, E-2C, BFTT ATC/AIC training)*



STOW Coyote Applications

- **Joint Synthetic Forces (JointSF)**
 - *AirSF/Soar is the air component of JointSF*
- **Synthetic Environment**
 - *Weather*
 - *Battlefield Obscuration*
 - *Dynamic Terrain and Multi-State Objects*
- **AirSF/SOAR Exercise Editor (EE)**
- **Ordnance Server**
- **Simulation Execution Environment (SEE)**
- **PerfMETRICS**
- **IVOX Communication**



HLA Interface Latency Data

- AFRL-TACCSF WAN latency varies from 11 - 19 msec
- STOW HLA Interface runs at 500 Hz
 - *Tested at entity counts up to 512*
- HLA Interface
 - *Added latency for HLA-to-DIS layer is 1/2 millisecond*
 - *RTI-to-RTI LAN at AFRL end-to-end latency is 4-6 milliseconds*

Bottom Line: No discernible impact on quality of entity state representation between DIS and HLA in AFRL simulator visual displays

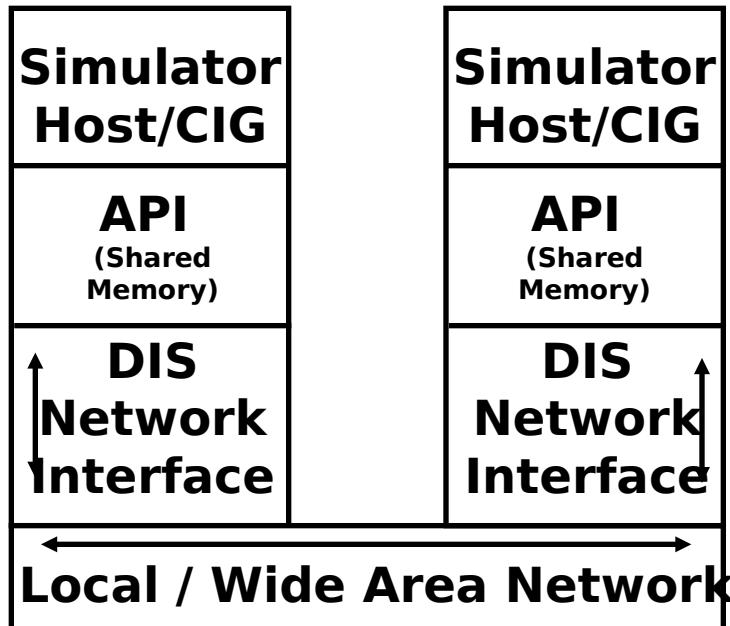


HLA Interface Latency Measurement



Latency measure
↔

DIS Case



Simulator Host/CIG

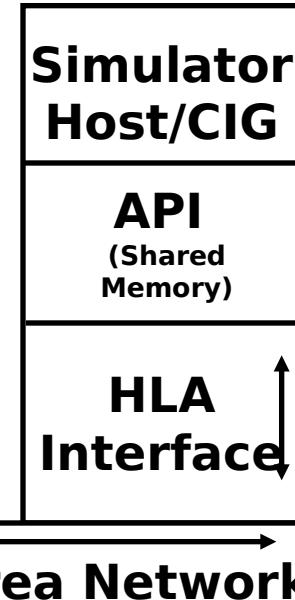
API
(Shared
Memory)

DIS
Network
Interface

HLA-DIS
Gateway

Local / Wide Area Network

HLA Cases



Hypotheses

- Cost to do HLA-DIS is minimal and offset by DDM as density increases.
- Cost for DIS and “native” HLA is similar for low density exercises.
- As density increases, HLA “keeps on going”, DIS dies